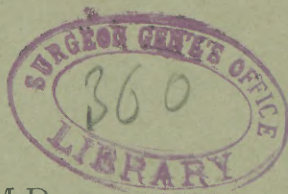


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PERFORATING TYPHOID ULCER.

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THE PROPRIETY OF SURGICAL INTERFERENCE IN PERFORATING TYPHOID ULCER.

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THE successful results which have so signally attended surgical operations upon the abdominal cavity and its contained organs, with the steady progress which has characterized the improvements in operative procedure, as well as the gratifying and positive addition to diagnostical knowledge, would seem to remove from discussion the question of the *propriety* of employing surgical measures in any condition involving the cavity or the organs within it. The present state of our knowledge and our largely accumulated experience have enabled us, however, to define with a degree of exactness the limits of surgical interference in certain affections in some of the organs. The elaborate experimental researches of Senn have proven that complete extirpation of the pancreas is invariably followed by death, while partial excision of the organ for injury or disease, amenable to treatment of this character, is a feasible and justifiable surgical procedure.

The critical analysis by Gross of the statistics of operations upon the spleen and the kidneys has made it possible to define clearly the limit of operation in affections of these organs. Thus, I venture to believe that we may approach the discussion of operative surgery in perforating typhoid ulcer, with the feeling that here we may be compelled to define a limit to the employment of surgical measures, not without regret at our inability to overcome the barriers which oppose success, but with a desire to maintain always the good repute of surgical science and art.

In studying this subject it is of supreme importance that a clear distinction should be made, and kept constantly in view, between the widely different conditions which precede and follow perforation in typhoid ulcer and in ulcerations of the intestinal tract due to other causes. A hasty conclusion might be arrived at thus: In both, peritonitis ensues, and, hence, the object of surgical interference is to arrest the action of the exciting cause, due to admission of the intestinal contents—and to treat the existing inflammation by irrigations and antiseptic applications. In one—simple perforating ulcer—experience has proven this treatment to be effective. Should it not be equally as effective in the other form?

While it is not within the scope of this paper to discuss at length the morbid anatomy and pathological lesions which are present in typhoid fever, it is necessary, in order to obtain a clear understanding of the conditions which, to a greater or less degree, complicate surgical procedures to bring them into view. Briefly, they may be divided into two classes—as those which are peculiar to the disease and always present, varying in character according to the severity of the attack, and those which are not peculiar to it, but are of more or less frequent occurrence. The former involve the agminate and solitary glands of the intestines, the mesenteric glands, the spleen, and other lymphatic structures of the body, and in the first of these occur the inflammatory lesion leading, in some cases, to intestinal perforation, with which condition the surgeon is called upon to deal. The lesions of the second class may be regarded as results of the general process, and consist of parenchymatous degenerations of various organs and tissues, as the brain, heart, arteries, blood, muscles, etc. The effect upon these organs is most marked in cases in which the pyrexia is of high grade and of long duration. The degenerative changes which take place in the muscular structures implicate as well the heart fibres, rendering this organ soft and flabby. Disorganization of the blood is a well-established lesion with the occurrence of endoarteritis in a proportion of cases. The liver and kidneys present changes in many instances, whilst, in some, diphtheritic inflammation of the

mucous membranes of the pharynx and larynx has occurred. In severe and protracted cases the infective process invades all organs and tissues of the body.

In contrast to these conditions let us consider those under which operations upon the abdomen are most frequently performed. In traumatisms, the general condition of the patient may be regarded as good—the injury being received in such a state of health as belongs to the individual; up to the time of operation the effects are expended upon organs and tissues in a comparative state of health. In inflammatory conditions, while the general system may be profoundly impressed, the lesion may be regarded as local in its nature, frequently confined to the organ immediately involved, and, when extending beyond it, expending the effects upon structures in a state of health. In diseases of a chronic character—including some forms of carcinomatous affections and conditions giving rise to functional disturbance of organs—the system has accommodated itself to the impression made by the morbid affection and degenerative changes which may occur are not usually general in character.

The symptoms which indicate perforation of the intestine in typhoid fever are, as a rule, so well defined as to make the diagnosis quite easy. They may be briefly stated to be sudden acute pain in the right iliac region accompanied by symptoms of collapse; in some cases marked decline of temperature soon follows the symptoms which denote the existence of peritoneal inflammation. Prostration increases and death ensues on the second or third day; rarely does it occur during the stage of collapse. Still more rarely the fatal result may be postponed two or three weeks after the first symptom of perforation has appeared. Instances are recorded in which recovery has taken place after perforation, adhesions occurring between the edges of the ulcer and the mesentery, an adjacent coil of intestine, or the abdominal wall.

Perforation may occur in the active progress of the disease or in the stage of convalescence. When it takes place in the early stages of the disease it may be regarded as the result of the extension of the ulcerative process to the peritoneal coat of the

intestine. The ingestion, at too early a period, of solid food or of indigestible food, is the most frequent cause of perforation during the stage of convalescence. Distention of the intestine by gas, feces, or enemata, as well as sudden and violent movements of the body, may cause perforation in this period of the disease.

The history of surgical interference in perforating typhoid ulcer may be briefly told, as up to this period a careful search of current medical literature reveals but four cases, in all of which a fatal result occurred. In chronological order of the cases in which laparotomy has been performed, that of Professor Kussmaul, of Strasburg, reported by Professor Lücke in the *Deutsche Zeitschrift für Chirurgie*, B. xxv. 1886-87, takes precedence. In a paper upon the "Abdominal Complications of Typhoid Fever," *Medical News*, November, 1887, Dr. T. S. K. Morton transcribes the following report of the case:

"A woman, aged twenty-eight years, was admitted to the Strasburg Obstetrical Clinic, on September 22, 1885, and very shortly afterward confined normally. The puerperium was tardy and she gradually developed a typhoid condition. This became so marked on October 14th as to justify a positive diagnosis of typhoid fever. All went well until the night of the 22d of October, when she was suddenly taken with agonizing pain in the abdomen and symptoms of collapse. In ten minutes she was seized with continuous chills, was cold, pale, and bathed with cold perspiration, pulse 180 and small, much vomiting; pain upon palpation of the abdomen and tenesmus were present. The patient was, a few hours later, transferred to the surgical clinic with the accompanying diagnosis of perforated typhoid ulcer.

"Professor Kussmaul saw the case almost immediately and determined upon abdominal section. Upon commencing the operation the patient's condition showed cold extremities, pulse small and weak, belly moderately distended and painful, great shock. Precautions were, warm room, legs carefully wrapped, rigid antisepsis. An incision was then carried from the umbilicus to the symphysis pubis. The incised tissues were found oedematous, and upon opening the peritoneum much dark, flaky, feculent fluid escaped. The intestines were pasted together and covered with fibrinous exudate. The coils of the small intestine were carefully drawn out, examined, and covered with

hot moist towels. They were found quite adherent to one another. One small perforation was found about a foot and a half above the ileo-cæcal valve. From it flowed yellow feculent material. The cæcum and vermiform appendix were negative. Mesenteric glands enlarged. That portion of the gut, including the perforation, was excised and stitched with Lembert sutures, the peritoneal cavity cleansed thoroughly with salicylic solution and sponging, a large drain placed in position, and the abdominal wound closed. The patient died in eleven hours, without reacting from shock.

"Necropsy proved the presence of broncho-pneumonia and hypostatic congestions, foul pus in Douglas's cul-de-sac, and fibrinous exudate everywhere in the peritoneum, while the drain tube was totally obstructed by a kink. The belly wound was in excellent condition. The site of resection was found to be nineteen inches above the ileo-cæcal valve, while on either side of the intestinal incision circular necrosis and inflammation were well advanced."

Dr. Morton briefly reports the second case, communicated to him by Mr. T. H. Bartleet, of Birmingham, England, who performed laparotomy in a case of perforating typhoid ulcer, in November, 1886. On opening the abdomen in this case great fecal extravasation was discovered. "An unsuccessful hurried search was made for the bowel opening, the cavity irrigated, a drain put in, and the parietal incision closed. The patient died during the second day after the operation."

The third case is that of Dr. R. B. Bontecou, of Troy, N. Y., reported in the *Journal of the American Medical Association*, January 28, 1888.

"Patient, æt. twenty-five, admitted to Infirmary October 11, 1887, with a temperature of 102°. On the 15th, the temperature rose to 104°, and patient complained of nausea and right iliac pain. The 16th, the pain increased and tympany appeared. On the 17th, the day of operation, the temperature was 104°—hiccough and vomiting of prune-juice matter—bowels constipated and tympanitic, pain in the abdomen still present; cold, clammy perspiration—peritonitis from intestinal perforation diagnosticated.

"On opening the abdomen a considerable quantity of flaky, dark-colored serum escaped. The appendix was found to be perforated near its base, and was ligatured and removed. On further search an

oval perforation in the ileum about ten inches from the colon and about one line in its longest diameter was found. The intestine was apparently sound in the vicinity and elsewhere, but deeply injected and rather dusky in color. The portion of intestine including the perforation was turned in longitudinally and the peritoneal surfaces were sutured by Lembert sutures, the abdominal cavity cleaned with a weak bichloride solution and the wound closed. No other perforations could be found. The man expired before he had recovered from the anæsthetic.

“With regard to the operation, Dr. Bontecou remarked that he was led to perform it on general principles, as the only thing to be done where intestinal perforation is recognized, appreciating the fact that it is a mortal accident and that with the light and aid of antiseptics he had faith and hope to save some case of the kind. The operation, he stated, could not impair the condition, and if the accident is recognized soon after its occurrence there is a chance of success.”

In *The Medical News* of December 24, 1887, Dr. T. G. Morton reported the fourth case in which laparotomy was performed on November 14, 1887, for the relief of perforating typhoid ulcer.

“This case is described as of that form commonly called a walking case, the patient having been scarcely in bed at any time until the last day and a half previous to his sudden death. It was at the end of the third week of the disease and his temperature had, for several days, been scarcely above the normal. The day before the operation he felt very well, ate a hearty meal of meat, etc., and in a few hours was seized with excruciating pain in the right lower portion of the abdomen, followed by a violent chill and elevation of temperature, pulse and respiration rate. The abdomen became tympanitic and the pain more diffuse. The patient was of splendid physical frame, and at the beginning of his illness had weighed 190 pounds. Laparotomy was performed twenty hours after perforation, the temperature being at that time $104\frac{1}{2}^{\circ}$, pulse 156, and respiration about 45. On opening the abdomen, yellowish serum, in which floated flakes of purulent lymph, gas and feculent matter escaped. The small intestine was turned out and examined from the cæcum upward. About three feet above the ileo-cæcal valve a perforation, about three-eighths of an inch in diameter, occupying the lower end of a large ulcerated Peyer's patch, was discovered. This lesion was repaired by turning the whole area of ulceration into the lumen of the bowel by means of eight Lembert

sutures, paying no attention to the ulcer and bowel-tissue between the line of sutures. A necrotic-looking ulcer, situated a short distance above the cæcum, which presented in a portion of its area a gray aspect, as if of sphacelus, but without perforation, was treated in the same manner by the introduction of six Lembert sutures. No other lesions were discovered upon further search of the intestines, etc., although ulcerations extended to quite a high point of the small gut. The whole intestine was greatly distended with gas and difficult to manipulate—it was congested to a dusky-red hue throughout, while in various sized patches, here and there, the peritoneal covering of the gut was in a state of arterial hyperæmia with occasional recent ecchymoses. The cavity of the abdomen was cleansed with hot water, sponged dry, and the intestines, which had been covered with towels wrung out in hot water frequently changed, were, with some difficulty returned, a glass drain carried to the bottom of the pelvic cavity, and the wound closed. After recovery from the anæsthetic, the pulse, temperature, and respiration remained very high, and six hours after the operation the patient suddenly sank into a collapsed condition, and in an hour died. Examination of the abdomen was made twenty-four hours after death and showed some of the coils of the upper portion of the intestines slightly adherent to each other by recent, healthy looking lymph. Others were congested to a bright pink color. There were no subperitoneal ecchymoses upon the intestines, but, here and there, upon the mesentery, near the intestinal attachment, were to be seen such extravasations. None was of a greater extent than a half-inch in diameter. In the deeper tissues of the intestine, however, ecchymotic spots were present at quite a number of points—one larger than a quarter of an inch in diameter. Typhoid ulcers extended to a distance of probably eight feet above the cæcum—those nearest it being most marked and, with one or two exceptions, furthest advanced. Those which had been treated by suturing were in excellent condition. No additional perforations were discovered, and the intestine when distended even forcibly with water did not leak or give way at any point. There was marked enlargement of the mesenteric glandular system. The peritoneum was perfectly clear, and free from extraneous matter, purulent lymph, or blood—about two ounces of clear serum had collected in the pelvic cavity since taking out the drain tube, which had been done a few minutes after death. The edges of the abdominal incision were glued together.”

The reports of the above cases have been transcribed in detail with some fear of extending this paper beyond proper limits, but with the feeling that an analysis of them will aid in arriving at correct conclusions with respect to the question under discussion. The first and the fourth cases—the former that of Prof. Kussmaul, the latter that of Dr. T. G. Morton—may be taken as typical cases illustrating the two classes into which attacks of the disease may be divided. In the first one the disease presented symptoms in an intense degree and perforation occurred at an early period, when the infective process was at its greatest height, and the vital forces at the lowest point. In the second case the disease was of a mild character from the first—a so-called “walking” case—the patient scarcely in bed during the attack, and the temperature scarcely above the normal. The perforation occurred at the end of the third week—in the period of defervescence—as the result of the irritation produced by the ingestion of improper food. Notwithstanding the marked difference in the character of the cases it will be observed that the shock consequent upon the perforation was in each equally prompt and profound. In Prof. Kussmaul’s case laparotomy was performed within a few hours after the occurrence of perforation, the bowel resected, the cavity cleansed of its contaminating contents, drain introduced, and the wound closed. Death without reaction from shock ensued in eleven hours. The autopsy showed, beside the usual typhoid lesions, that the reparative process in the intestinal operation wound was defective—circular necrosis and inflammation being well advanced. Laparotomy was performed in Dr. Morton’s case twenty hours after perforation, two ulcers, one non-perforating, were repaired by Lembert sutures, the peritoneal cavity thoroughly cleansed, drainage secured, and abdominal incision closed. Six hours after operation the patient “sank into a collapsed condition” and died. The tests which were applied showed that the operative procedures had been efficient.

Both operations were performed under strict antiseptic methods and every precaution taken to reduce the shock of operation. The full report made of the autopsy in Dr. Morton’s case shows that despite the apparently mild character of the attack, as

evinced by the symptoms, the specific lesions of the disease were very prominent and distinctly defined—typhoid ulceration extending to a distance of probably eight feet above the cæcum, and marked enlargement of the mesenteric glandular system being present. Seemingly the patient did not withstand the shock of operation as well as the patient of Prof. Kussmaul, whose condition was more unfavorable and who was submitted to a more prolonged operation, that of resection of the intestine.

In connection with the records of the above cases it will be of interest to refer to the case reported by Dr. J. C. Wilson, in the *Medical Times* of December 11, 1886, in which recovery followed an attack of peritonitis in enteric fever.

“In this case the patient, a girl æt. twelve years, was seized, on September 13, 1886, one month following the beginning of the febrile attack in the stage of defervescence, with severe abdominal pain, accompanied by a chill, nausea and vomiting, and marked pulse and temperature elevation—the condition supervened upon the ingestion of food of a slightly solid character. Dr. Keen was summoned in consultation with a view to the performance of laparotomy should the necessity arise. The absence of any signs of collapse after the chill rendered the diagnosis of perforation doubtful, and the patient was placed upon a full opium treatment with counter-irritant applications to the surface of the abdomen. In nine days convalescence was re-established with tenderness in front of the border of the ileum and local dulness upon percussion.”

In commenting upon this case, Dr. Wilson states that while it is impossible to say with certainty what the lesion has been in cases which recover, a consideration of knowledge derived from clinical and post-mortem examinations warrants us in dividing cases of peritonitis occurring in typhoid fever into two perfectly well characterized groups. The case reported illustrates the first class—cases of mild enteric fever in which peritonitis is the result of extension of the inflammation from the mucous to the serous surface without direct penetrating lesion of the wall of the intestine producing a local peritonitis. In these cases, under favorable conditions, adhesions occur between the inflamed surface and adjacent structures, and per

foration is averted by the patch thus put upon the weakened bowel. Even when perforation has occurred, adhesions of this character have prevented fecal extravasation to any considerable extent, and recovery may follow the attack of peritonitis which takes place. Such were the conditions believed to exist in the case reported, and in selected cases of this group he urged earnestly the institution of operative measures for the relief of the existing peritonitis and perforation, when present, as had been done by Prof. Kussmaul the year before, in a case much less favorable in character. Upon this point he says: "Granted that the chance of a successful issue is heavily against you; that the patient is in the midst or at the end of a long sickness; that his tissues are in the worst state to stand the injuries of the surgeon's knife; that the lesions of the gut may be very extensive; that the vital forces are at the lowest ebb. No one yet has hesitated to perform tracheotomy in the laryngeal complications of enteric fever, which require it to save life, for these reasons." The free quotation from Dr. Wilson's paper has been made in order to emphasize certain points before referred to, and to direct attention to the wide difference which must necessarily exist in the effects produced by the operations of tracheotomy and laparotomy in the complications of typhoid fever. Speaking surgically, the two operations cannot be compared in their effects, and the performance of the former cannot be urged as an argument in favor of the employment of the latter. The character and extent of the tissues involved make it impossible to institute a comparison, and above, an effort has been made to show that, in the different forms of peritonitis and in gunshot wounds of the abdomen, to which reference is also made, the systemic conditions differ so markedly from those which are present in typhoid fever, as to render comparison impossible. Successful operation in the former cannot give promise of the same result in the latter.

For statistical purposes the value of the deductions made from the study of the very limited number of cases presented may be questioned. Lacking numbers of cases, we have been, however, fortunate in being able to study one case of each type of

the disease and presenting two different methods of operation, one by suture and one by resection. What conclusions are we prepared to draw from this study? To what must we attribute the fatal results in the two cases reviewed? The operations were, in each, performed by surgeons of experience, under strict antiseptic methods and within a reasonably short period after the occurrence of perforation; the autopsy did not show that the interval, which had occurred between the time at which perforation took place and the performance of laparotomy, had added any complications. The prolonged exposure of the cavity caused by the methods of operation employed must be considered as harmful, and may have contributed to the fatal result. Experience has taught that although prolonged exposure is objectionable in any condition for which laparotomy is performed, it may not, in itself, be regarded as fatal. Clearly we must go further and find the failure of success in the systemic condition, in the degenerated and devitalized conditions of the organs and tissues caused by the infective process in active progress, utterly deprived of the power to resist the shock of operation, or in the condition of these structures beginning to recover from the effects of the poison in milder form, extremely sensitive to any rude impressions, and wanting in tone and power of resistance. It is in the latter condition, alone, that the surgeon may hope to achieve success by surgical interference, and then only when such methods are adopted as will reduce to the lowest point the shock of operation.

The following propositions, with accompanying suggestions, are submitted in the hope that the experience of the future may prove that the limits of surgical art can be so extended as to include in the list of justifiable and successful operations, laparotomy in certain forms of perforating typhoid ulcer.

1. Surgical interference is not justifiable and should not be instituted in cases of typhoid fever in which perforation occurs when the infective process is at its height. This conclusion is based upon our knowledge of the morbid conditions peculiar to and present in the disease, and the effects produced by them upon the general system.

2. In mild cases of the disease, in which the pyrexia has not been of high grade and in which perforation occurs at the end of the third week, or later, when the stage of convalescence is fully pronounced, laparotomy may be performed. Surgical interference in cases of this character is advocated with the hope that if the method of operation suggested by Lücke—laparotomy with the creation of an artificial anus—be adhered to, success may be accomplished.

3. Rapidity in operation will be an essential factor in the achievement of success, through which prolonged exposure of the cavity will be avoided and shock greatly lessened. Median incision having been made, the hand should be passed to the position of the ileo-cæcal junction, the ileum seized, drawn into the wound, and examined as it is slipped through the hand, which should remain in the cavity. The perforation being found, the portion of intestine including it should be quickly sutured to the edges of the abdominal incision, the sutures being introduced at sufficient distances from the ulcer edges to insure inclusion of healthy tissues. Hot antiseptic solutions should be then poured, in sufficient quantity, into the cavity, a glass drainage tube carried to the floor of the pelvic cavity, and the wound closed. Prolonged "toilette" of the peritoneal cavity, as it is generally understood, should not be made while the cavity is open. Irrigations through the drain tube should be made as soon as the cavity is closed, and should be repeated at such intervals as the surgeon may deem proper. So extremely rare is the occurrence of double or multiple perforation that, after the discovery of one opening, further search of a critical and prolonged character may be safely omitted. As, in the cases in which operation is deemed advisable, the perforation is not due to the extension, "*per se*," of the ulcerative action, but to what may, almost always, be designated as a mechanical cause, the absolute quietude of the patient, which must be enforced, as well as the rest secured to the intestine by the operation for production of artificial anus, whereby the free escape of the feculent contents and gas is facilitated, will contribute largely to the prevention of further perforations. Should the patient survive, relief from the artificial anus can be obtained by operation.

